Discovering and Utilizing Coastal Ocean Data via NASA's CMDS

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Background

The NASA Coastal Marine Discovery Service (CMDS) is a NASA ACCESS Project wherein which we seek to aggregate and make easily available a number of critical oceanographic data repositories including (but not limited to) NOAA's ERDDAP, NOAA's IOOS, and NASA's ECCO-II. The project is leveraging heavily on existing open source technologies and platforms including the software resultant from the ACCESS 2007 Virtual Oceanographic Data Center (VODC), as well as several other systems including Apache Solr, OPeNDAP and Apache OODT. One of the key targets of the CMDS project is to easily expose coastal datasets via the EASy GIS toolkit, a mature GIS technology of choice amongst many coastal scientists. This poster provides the current status of CMDS and suggest key areas of future work and activities.

CMDS makes discovery and utilizations of coastal marine resources as transparent as possible. Based on the harvesting of descriptive metadata from external THREDDS and OPeNDAP catalogs a user can query our Solr metadata index (a database) through a number of facets (e.g. by parameter, standard name, data center). Once datasets of interest are discovered the system will connect them via a seamless step to the EASy Netviewer for further visualization, data interrogation and extraction. No other system currently has the capabilities of the complete end-to-end of specific dataset discovery-visualization-utilization of CMDS.

Sample of CMDS Datasets

- **Satellite: Level 2,3 and 4 products for SST, Chl A, Turbidity, Wind, SSH, Salinity**
- **Ocean Models: 3D Salinity, Depth, Temperature and Currents**
- **Currents: Coastal HF Radar**
- **In situ data: Ship, buoy, and glider observations of SST, Wind and Currents**
- **Historical: CalCOFI reports, fish surveys, scientific cruises**
- **GIS coverages and other point data: Bathymetry, marine sanctuary boundaries, socio-economic**

Future Progress

- Deployment and integration of v1 NetViewer by Dec 2011 to http://cmds-gis.jpl.nasa.gov/Export
- Additional metadata (dataset) harvesting by Jan 2012
- Maintenance of Solr index. Ongoing.
- User base development. Ongoing
- Deployment of additional statistical and query capabilities for v2 NetViewer by May 2012
- Deployment into PO.DAAC "Labs" by Jul 2012 (http://podaac.jpl.nasa.gov/PODAAC_Labs)

User Web Interfaces

Figure 1. The Project has implemented a discovery user interface based on the Earth System Grid Federation previously used to disseminate and discover climate data resources (e.g., IPCC CMIP5). This leverages a standardized interface for straightforward access. Examples show discovery results and the spatial search (bounding box) interface. Temporal search interface also available.

Figure 2. The main Project public website: http://cmds.jpl.nasa.gov Example shows the Plone interface to the Solr metadata index for dataset searching. Exposed here are the data repositories currently indexed.

Tool/ Interface	Data Discovery	Visualization	Data interrogation	ROI Statistics	Export	Shapefile support
CMDS/ NetViewer	"quasi-Federated"	✔	✔	✔	✔	✔
IDV	Specific THREDDS	✔	✔	No	No	No
Live Access Server	Specific LAS	✔	No	No	✔	No
Godiva2	Specific THREDDS	✔	No	No	No	No
Panoply	None	✔	Table format	No	✔	No
netCDF-JavaToolUI	Specific THREDDS	✔	✔	No	No	No

Table 1. Comparison of different tools and interfaces for (mostly satellite) data utilization.

EASy GIS NetViewer

The Environmental Analysis System (EASy. http://runeasy.com) is an advanced GIS with the capability to view, analyze and store diverse types of environmental data. Unlike other GIS software, EASy has been specifically designed to display data utilizing time, depth and geo-spatial information. This dynamic 3-D capability is vital for studying marine and terrestrial environments with their complex horizontal and vertical structures. EASy has been used in a range of national and international oceanographic projects dealing with pollution, resource management, and coastal monitoring (over 40 oceanographic projects including the mapping of fishery data and environmental conditions in the Gulf of Alaska, the Bering Sea, and the Eastern Equatorial Pacific Ocean, the tracking of electronically tagged turtles, sharks, and pelagic fish).

We have integrated **the web client based** capabilities of EASy (called NetViewer) into our CMDS system via the use of its open APIs and interfaces. The crux of the effort will be linking EASy's GIS NetViewer application with the APIs exposed by CMDS's Solr-based architecture.

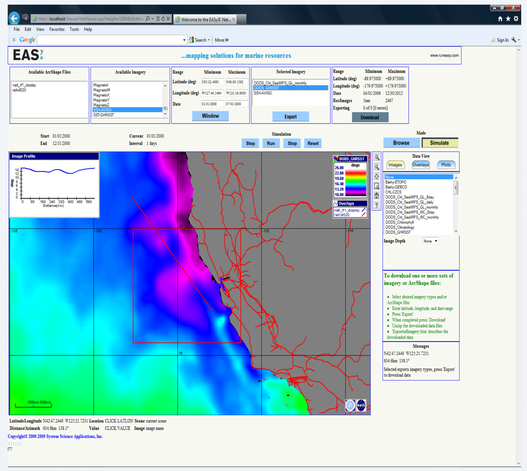

Figure 3. SST data for California dynamically acquired on-the-fly from an OPeNDAP URL. User has the ability to interrogate actual values, draw transects (redline), perform statistical summary and export. A list of other available datasets such as Chl a and SSH are shown to the right.

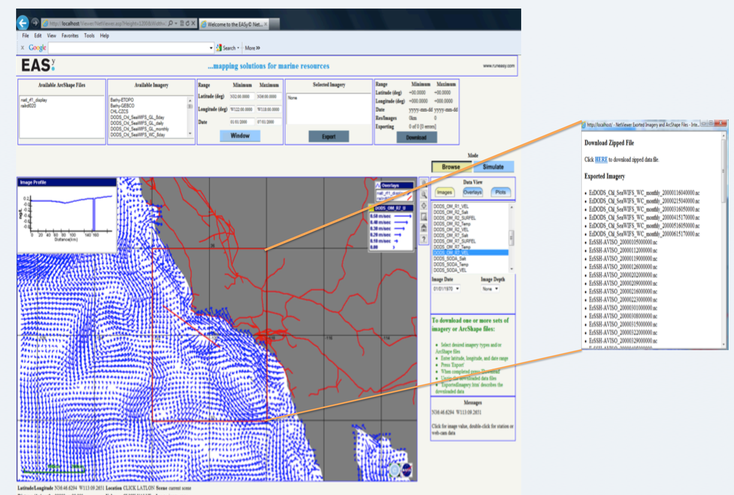

Figure 4. Additional example showing ocean currents from the NCOM ocean model. All data layers imported can be exported by the user in the region of interest (preserved in their native formats).

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